Subchapter 5

Mixing Zones in Surface and Ground Water

17.30.501 PURPOSE (1) The purpose of this subchapter is to implement 75-5-301(4), MCA, which requires the board to adopt rules governing the granting of mixing zones consistent with the provisions of 75-5-302 through 75-5-307 and 80-15-201, MCA. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.502 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, and ARM Title 17, chapter 30, subchapters 6 and 7, apply throughout this subchapter:

(1) "Acute toxicity" means a condition in which ambient water concentrations exceed the applicable acute aquatic life standards given in department Circular DEQ-7.

(2) "Chronic toxicity" means a condition in which ambient water concentrations exceed the applicable chronic aquatic life standards given in department Circular DEQ-7.

(3) "Constructed wetland" means a wetland intentionally designed, constructed and operated for the primary purpose of wastewater or stormwater treatment or environmental remediation.

(4) "Currently available data" means data that is readily available to the department at the time a decision is made. It does not mean new data to be obtained as a result of departmental efforts or required of the applicant.

(5) "Human health standard" means the parameters listed as human health standards in department Circular DEQ-7.

(6) "Mixing zone" is defined in 75-5-103, MCA, and also means a limited area of a surface water body or a portion of an aquifer, where initial dilution of a discharge takes place and where water quality changes may occur and where certain water quality standards may be exceeded.

(7) "Nearly instantaneous mixing zone" means an area where dilution of a discharge to water by the receiving water occurs at a nearly instantaneous rate, with the result that its boundaries are either at the point of discharge or are within two stream widths downstream of the point of discharge.

(8) "Narrative standards" means those parameters listed as narrative standards in department Circular DEQ-7.

(9) "Numeric acute standards" means the parameters listed as acute aquatic life standards in department Circular DEQ-7.

(10) "Numeric chronic standards" means the parameters listed as chronic aquatic life standards in department Circular DEQ-7.

(11) "Standard mixing zone" means a mixing zone that meets the requirements of ARM 17.30.516 and 17.30.517 and involves less data collection and demonstration than required for a source specific mixing zone.

(12) "Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

(13) "Zone of influence" means the area under which a well can be expected to remove water.

(14) The board adopts and incorporates by reference Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (October 2012 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, ~~nutrient,~~ radioactive, and harmful parameters, and also establishes human health-based water quality standards for the following specific nutrients with toxic effects: nitrate, nitrate + nitrite, and nitrite. Copies of Department Circular DEQ-7 are available from the Department of Environmental Quality, P.O. Box 200901, Helena, MT 59620-0901.

(15) Except as provided for in (16), the board adopts and incorporates by reference Department Circular DEQ-12, entitled "Montana Base Numeric Nutrient Standards and Nutrient Standards Variances," Part A (December 2013 edition) which establishes numeric water quality standards for total nitrogen and total phosphorus in surface waters, and Part B (December 2013 edition) which establishes variances from the numeric water quality standards for total nitrogen and total phosphorus in surface waters adopted by the board in Part A. Copies of Department Circular DEQ-12 are available from the Department of Environmental Quality, P.O. Box 200901, Helena, MT 59620-0901.

(16) If a court of competent jurisdiction declares section 75-5-313 or any portion of that statute invalid, or if the United States environmental protection agency disapproves section 75-5-313 or any portion of that statute under 30 C.F.R. 131.21, then subsection (15) is void, and the narrative water quality standards contained in 17.30.637 are the standards for total nitrogen and total phosphorus in surface water (except for the Clark Fork River, for which the standards are the numeric standards in 17.30.631).

(History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, 1996 MAR p. 1499; AMD, 1998 MAR p. 2487, Eff. 9/11/98; AMD, 2002 MAR p. 387, Eff. 2/15/02; AMD, 2003 MAR p. 217, Eff. 2/14/03; AMD, 2004 MAR p. 725, Eff. 4/9/04; AMD, 2006 MAR p. 528, Eff. 2/24/06; AMD, 2008 MAR p. 946, Eff. 5/9/08; AMD, 2010 MAR p. 1796, Eff. 8/13/10; AMD, 2012 MAR p. 2060, Eff. 10/12/12.)

Rules 17.30.503 and 17.30.504 reserved

(g) Aquifer characteristics: when currently available data indicate that the movement of ground water or pollutants within the subsurface cannot be accurately

predicted, such as the movement of ground water through fractures, and also indicate that this unpredictability might result in adverse impacts due to a particular concentration of a parameter in the mixing zone, it may be appropriate to deny the mixing zone for the parameter of concern.

(h) Ground water discharges to surface water: In the case of a discharge to ground water which in turn discharges to surface water within a reasonably short time or distance, the mixing zone may extend into the surface water, and the same considerations which apply to setting mixing zones for direct discharges to surface water will apply in determining the allowability and extent of the mixing zone in the surface water.

(i) Discharges to intermittent and ephemeral streams: the "natural condition" of these waters during periods of no flow will be the average quality that occurs during periods when flow is present. If a proposed discharge occurs when there is no flow, the quality of the discharge must be at or better than this quality. If variations in seasonal stream flow are known and a mixing zone is limited to use during periods when dilution is available, such a mixing zone may be allowed by the department. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.507 SPECIFIC RESTRICTIONS FOR SURFACE WATER MIXING ZONES (1) Mixing zones for surface waters are to comply with the following water quality standards:

(a) narrative water quality standards, standards for harmful substances, numeric acute and chronic standards for aquatic life, standards in Circular DEQ-12 Part A unless a nutrient standards variance from the base numeric nutrient standards has been granted pursuant to DEQ-12 Part B, and standards based on human health must not be exceeded beyond the boundaries of the surface water mixing zone;

(b) acute standards for aquatic life for any parameter may not be exceeded in any portion of a mixing zone, unless the department specifically finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses.

(2) Discharges to wetlands (other than constructed wetlands) will not be granted a mixing zone for parameters for which the state has adopted numeric acute or chronic standards for aquatic life or for human health in the surface water quality standards, unless the following can be demonstrated to the satisfaction of the department:

(a) the standards referenced in (1) will not be exceeded beyond the boundaries of the mixing zone;

(b) existing beneficial uses will not be threatened or harmed; and

(c) the conditions in 75-5-303(3), MCA, are met.

(3) For discharges to surface water that first pass through the ground, such as discharges from infiltration systems or land application areas, the surface water mixing zone begins at the most upstream point of discharge into the receiving surface water. If the discharge continues to occur downstream beyond a distance equal to 10 times the stream width measured at the upstream discharge point at low flow, a standard mixing zone will not be granted. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.508 SPECIFIC RESTRICTIONS FOR GROUND WATER MIXING ZONES (1) Mixing zones for ground water are to be limited and comply with the following water quality standards:

(a) Human health based ground water standards must not be exceeded beyond the boundaries of the mixing zone.

(2) No mixing zone for ground water will be allowed if the zone of influence of an existing drinking water supply well will intercept the mixing zone. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)

Rules 17.30.509 through 17.30.514 reserved

17.30.515 DEPARTMENT PROCEDURES (1) The department will determine whether a mixing zone is appropriate for a particular discharge during the department's permit, permit renewal, approval, order, or authorization review process pursuant to the rules in this subchapter. The department may determine that:

(a) no mixing zone shall be granted;

(b) the standard mixing zone applied for is appropriate;

(c) the source specific mixing zone applied for is appropriate; or

(d) an alternative or modified mixing zone, as defined by the department, is appropriate.

(2) A person applying to the department for a mixing zone must indicate the type of mixing zone applied for and supply sufficient detail for the department to make a determination regarding the authorization of the mixing zone under the rules of this subchapter.

(3) A source specific mixing zone may not be used unless approved by the department.

(4) In making a determination of nonsignificance under the rules in ARM Title 17, chapter 30, subchapter 7, a person may use a standard mixing zone without approval from the department or request that the department specifically designate a mixing zone, which may be either a standard or source specific mixing zone.

(5) Department determinations regarding mixing zones will be accomplished within the time frames required for the underlying permit, approval, or authorization, and the applicant will be notified of that determination according to those same requirements. In all other cases, department determinations will be made and the applicant notified within 30 days after receipt of a complete application.

(6) After receiving notification of the department's determination the applicant

may:

(a) accept the department's determination;

(b) modify the proposed mixing zone and reapply; or

(c) appeal the department's decision pursuant to any applicable provision of law. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.516 STANDARD MIXING ZONES FOR SURFACE WATER (1) If a discharge to surface water is small in comparison to the volume of the receiving water or if the mixing is nearly instantaneous and the parameter(s) of concern will not threaten or impair existing uses as determined under ARM 17.30.506, a standard mixing zone may be used.

(2) A standard surface water mixing zone will not be granted for a new or increased discharge to a lake or wetland.

(3) Facilities that meet the terms and conditions in (a) through (de) qualify for a standard mixing zone as follows:

(a) Facilities that discharge a mean annual flow of less than one million gallons per day (MGD) to a stream segment with a dilution ratio greater than or equal to 100:1. For purposes of this procedure, the stream dilution ratio is defined as the seven-day, 10-year (7Q10) low flow of the stream segment without the discharge, divided by the mean annual flow of the discharge. In this case discharge limitations will be based on dilution with the 7Q10.

(b) Facilities that discharge a mean annual flow less than one MGD to a stream segment with a dilution less than 100:1. In cases where dilution is less than 100:1, discharge limitations will be based on dilution with 25% of the 7Q10.

(c) Facilities that discharge to surface waters through the ground may qualify for a standard surface water mixing zone.

(d) Facilities whose discharge results in a nearly instantaneous mixing zone. Discharge limitations shall be based on dilution with the seven-day, 10-year low flow of the receiving water except as limited by consideration of the factors listed in ARM 17.30.506. For surface waters, nearly instantaneous mixing will be assumed when there is an effluent diffuser which extends across the entire stream width (at low flow), or when the mean daily flow of the discharge exceeds the seven-day, 10-year low flow of the receiving water. A discharge may also be considered nearly instantaneous if the discharger so demonstrates in accordance with a study plan approved by the department. For the purposes of this demonstration nearly instantaneous mixing will be assumed when there will be not more than a 10% difference in bank-to-bank concentrations at a downstream distance less than two stream/river widths.

(e) Facilities that discharge to surface water the parameters found in DEQ-12 Part A. Discharge limitations shall be based on dilution with the entire seasonal 14-

day, 5-year (seasonal 14Q5) low flow of the receiving water without the discharge.

(4) The length of a standard mixing zone for flowing surface water, other than a nearly instantaneous mixing zone, must not extend downstream more than the one-half mixing width distance or extend downstream more than 10 times the stream width, whichever is more restrictive. For purposes of making this determination, the stream width as well as the discharge limitations are considered at the 7Q10 or seasonal 14Q5 low flow. The seasonal 14Q5 low flow is to be used only in conjunction with base numeric nutrient standards in DEQ-12 Part A. The recommended calculation to be used to determine the one-half mixing width distance downstream from a stream bank discharge is described below.

(a) $A_{1/2} = [0.4(W/2)^2V]/L$, where:

(i) $A_{1/2}$ = one-half mixing width distance;

(ii) W = width in feet at the 7Q10 or seasonal 14Q5;

(iii) V = velocity of the stream at the 7Q10 or seasonal 14Q5 downstream of the discharge (in ft/second);

(iv) L = lateral dispersion coefficient for the 7Q10 or seasonal 14Q5 downstream of the discharge (in ft^2/second), where:

(b) L = CDU, where:

(i) C = channel irregularity factor immediately downstream of the discharge, where:

(A) C = 0.1 for straight, rectangular streams;

(B) C = O.3 for channelized streams;

(C) C = 0.6 for natural channels with moderate meandering;

(D) C = 1.0 for streams with significant meandering; and

(E) C = 1.3 for streams with sharp 90º or more bends;

(ii) D = average water depth at the 7Q10 or seasonal 14Q5 downstream of the discharge (in feet);

(iii) U = shear velocity (in ft/sec), where:

(c) $U = (32.2DS)^{1/2}$, where:

(i) 32.2 is the acceleration due to gravity (32.2 ft/sec^2);

(ii) D = average water depth at the 7Q10 or seasonal 14Q5 downstream of the discharge (in feet); and

(iii) S = slope of the channel downstream of the discharge (feet/feet).

(5) Monitoring may be required at the downgradient boundary of a surface water mixing zone only when there is a site-specific, impact-related reason to require such monitoring.

(6) A standard surface water mixing zone may be modified by the department on a case-by-case basis depending upon existing uses, flow regime, and the configuration of the stream channel. Where currently available data indicates that

modifying a standard mixing zone would threaten or impair existing beneficial uses under ARM 17.30.506, the facility will not qualify for this modification procedure. (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, 1996 MAR p. 1499; AMD, 2006 MAR p. 528, Eff. 2/24/06.)

17.30.517 STANDARD MIXING ZONES FOR GROUND WATER (1) The following criteria apply to determine which discharges qualify for a standard ground water mixing zone:

(a) A standard ground water mixing zone is generally applicable in unconfined aquifers, but may not be appropriate for semi-confined or confined aquifers or in aquifers where ground water moves through fractures.

(b) Disposal systems that discharge to ground water through infiltration, drainfields, injection through a disposal well, leakage from an impoundment, seepage from a land application area, or other methods may qualify for a standard mixing zone.

(c) To determine if the discharge qualifies for a standard ground water mixing zone, the person proposing the discharge must estimate the anticipated concentration of pollutants at the downgradient boundary of the mixing zone (aquatic life standards do not apply in ground water). If the estimated concentration meets the nonsignificance criteria at the boundary of the mixing zone, as specified in ARM Title 17, chapter 30, subchapter 7, the discharge qualifies for a standard mixing zone.

REASON: New circular DEQ-12, which contains base numeric nutrient standards and variances from those standards, is incorporated into the mixing zone rules. The manner in which nutrients affect and impact beneficial uses in streams and rivers is different from toxic and harmful compounds found in DEQ-7 and it was necessary to develop an appropriate low-flow design flow (the seasonal 14Q5) specifically for permitting nutrient discharges. Derivation of the seasonal 14Q5 is discussed in the proposed changes to 17.30.635. Here, the rule changes incorporate the seasonal 14Q5 flow into the calculations used to determine the length of a standard mixing zone. 17.30.516 has been amended to provide that the full volume of a seasonal 14Q5 (as opposed to some fraction of it) is to be used for dilution calculations for nutrients in DEQ-12 Part A. This allowance reflects the non-toxic nature of nutrients at the concentrations found in DEQ-12 Part A.